layer prior to laminating the second layer onto the discontinuous layer, whereby said adhesive is trapped between said first and second thermoplastic layers of the metallized sheeting.

REMARKS

The remainder of this amendment is set forth under appropriate sub-headings for the convenience of the Examiner.

Applicant's Invention

Applicant's claimed method, as amended, is directed to forming a metallized composite, including the step of depositing a metal on a first thermoplastic layer to form a discontinuous layer of metal, the discontinuous layer being formed of discrete islands of metal. A second thermoplastic layer is laminated onto the discontinuous layer to form the metallized composite.

Advantages of Applicant's Invention

Applicant's claimed invention has several advantages. For example, in forming the discontinuous metal layer of discrete metal islands, the need for etching to minimize the amount of metal between islands in order to improve adhesion between the first and second layers can be significantly reduced or eliminated. Reduction or elimination of etching, in turn, can significantly improve the appearance of finished parts, such as mirrors. Further, reflective surfaces formed by discontinuous layers of discrete metal islands laminated between thermoplastic layers are flexible and can be applied to apparel, footwear, and other applications, while providing the appearance of being perfectly reflective.

Amendment of the Title

The Title of this application has been changed to more accurately reflect that the subject matter of the claimed invention is directed to a method.

Amendment of the Specification

A paragraph has been added at page 12, line 6 to provide literal support for original Claim 26, as filed. As amended, the specification fully supports originally-filed Claim 26. No new matter has been added.

Amendment of the Claims

Claims 1, 4, 5, 17 and 19 have been amended. Specifically, Claim 1 has been amended to include the additional element that the discontinuous layer of metal formed includes discrete islands of metal. Support for this amendment can be found in the specification at page 9, lines 6 through 10, at page 10, lines 8 through 16, and at Figures 2 and 3. Claim 1 also has been amended to correct minor self-evident typographical errors. No new matter has been added.

Claims 4 and 5 have been amended to make more clear that the additional steps of these claims are those of thermoforming and vacuum-forming the metallized composites, respectively. Support for these amendments can be found in the specification at page 5, lines 17-20.

Claims 17 and 19 have been amended to change their dependency from Claim 15 to Claim 13. Support for these amendments can be found in the specifications at page 11, lines 19 through 24, and at page 11, lines 12 through 18, respectively.

Claim to Priority

The Examiner stated that the instant application repeats a substantial portion of prior U.S. Serial Number 09/233,545, filed December 30, 1998, and adds claims and additional disclosure not present in the prior application. The Examiner further stated that, since the application names an inventor named in the prior application, the instant application may constitute a continuation-in-part if Applicant claims the benefit of the filing of the prior application under 35 U.S.C. §120 and 37 C.F.R. § 1.78.

Applicant specifies in the utility patent application transmittal of the instant application, at Box 18, that this application is a divisional of U.S. Serial Number 09/223,545, filed on December 30, 1998 (now U.S. 6,455,138 B1). U.S. Serial No. 09/233,545 is unrelated; it is believed that Examiner intended to recite U.S. Serial No. 09/223,545. Further, Applicant claims priority to U.S. Serial No. 09/223,545 under "Related Applications" paragraph at page 1, lines 3-

7 of the instant application. Therefore, Applicant has claimed priority to the earlier application as a divisional of that application. The instant divisional application differs from the disclosure set forth in the earlier application, U.S. Serial No. 09/223,545, only in the content of the Related Applications section and in the content of the claims. The claims, in turn, differ from the parent application only in that Claims 1-70 of the parent application do not appear, and in that Claims 71-96 of the parent application have been renumbered as Claims 1-26 in the divisional application. No new matter has been added to the divisional application.

The Examiner also stated that Claims 4, 5, 17, 19 and 26 lack support in parent U.S. Serial No. 09/223,545. In response, Applicant has amended Claims 4, 5, 17 and 19. Support for Claim 26 can be found in cancelled original Claim 96 of the parent application.

Sufficiency of the Specification

Examiner stated that the specification lacks antecedent basis for Claims 4, 5, 17, 19 and 26. In particular, the Examiner stated that the specification only provides antecedent basis for thermoforming or vacuum-forming the composite sheet itself, and not a polymer at the surface of the composite.

Amendments to the claims and specification are discussed above. To reiterate, Claims 4 and 5 have been amended to recite that the metallized composite itself is thermoformed or vacuum-formed. Support for these claim amendments, as suggested by the Examiner, can be found at page 5, lines 17-20, of the specification. Claims 17 and 19 have been amended to be dependent from independent Claim 13, thereby obviating the basis for the Examiner's objection with respect to these claims. The specification has been amended by adding a paragraph at page 12, line 6 to provide support for independent Claim 26. Claim 26, in turn, provides support for the amendment to the specification requested by the Examiner.

Claim Objection

The Examiner objected to Claim 1. In particular, the Examiner stated that the phrase "to from a discontinuous" should be amended to read "to form a discontinuous." Claim 1 has been amended as requested by the Examiner.

Rejections of Claims 4 and 5 Under 35 U.S.C. § 112, First Paragraph

The Examiner stated that the specification, while enabling for thermoforming or vacuum-forming the metallized composite, does not reasonably provide enablement for thermoforming or vacuum-forming a thermoplastic polymer at a surface of the metallized composite, as is required by Claims 4 and 5.

As discussed above, Claims 4 and 5 have been amended to be consistent with the specification. As amended, Claims 4 and 5 are supported by the specification, thereby obviating the basis for this rejection of these claims.

Rejection of Claims 17-20 Under 35 U.S.C. § 112, First Paragraph

The Examiner stated that Claims 17 and 19 include the limitation of bonding by depositing an adhesive, but depend from Claim 15, which includes the limitation of bonding by at least partially melting the layers to become a continuous plastic sheet. The Examiner further stated that the specification does not describe how the layers can be bonded both by an adhesive and by partially melting thermoplastic layers to become a continuous sheet.

Claims 17 and 19 have been amended to be dependent from independent Claim 13, which does not include the limitation of partially melting thermoplastic layers to form a continuous thermoplastic sheet. As amended, Claims 17 and 19 are supported by the specification. Claims 18 and 20 depend from Claims 17 and 19, respectively, and, therefore, are also supported by the specification. The specification meets the requirements of 35 U.S.C. § 112, first paragraph, as applied to Claims 17-20, as amended.

Rejection of Claims Under 35 U.S.C. § 103(a) in View of U.S. 4,756,414

Claims 1, 6, 9, 13, 23 and 24 are rejected under 35 U.S.C. § 103(a) as being unpatentable in view of U.S. 4,756,414, issued to Mott (hereinafter "Mott"). In particular, the Examiner stated that Mott teaches the method of forming a discontinuous metal layer on a plastic layer and joining another plastic layer over the discontinuous metal to form a laminated metallized composite. Further, the Examiner stated that, by attaching a closure device to the formed sheet material, as disclosed by Mott, the metallized composite sheet material is obviously adhered to a substrate, as set forth in Claim 6.

Mott teaches a method of forming antistatic sheet material and packages for containing electrostatic components to protect them from potentially damaging electrostatic charges. The antistatic sheet material includes first and second flexible plastic layers partitioned by a metal layer. The metal layer operates as a Faraday cage to protect contents of a package formed of the material from external electric fields. As stated in the specification at Column 3, lines 15-22:

> The flexible sheet material and process for making it provide a flexible packaging material and package which has permanent antistatic properties on both interior and exterior facing surfaces of a package. The metal layer is embedded in the multilayer structure and cannot flake off or peel when the package is flexed and provides a Faraday cage to protect the contents of the package from external electric fields.

As further stated at Col. 5, lines 47-53:

> Layer 44, if vacuum deposited or sputtered, is preferably about 50 to about 200 Angstroms thick, and most preferably about 100 Angstroms thick. Its surface resistivity is preferably about 100 ohms/sq. [sic] The coating may be discontinuous and/or have pinholes therein and with no substantial adverse effect on the Faraday-cage structure which results when the package is formed.

A "Faraday cage," also known as a Faraday shield, is defined by the *McGraw-Hill Dictionary of Scientific and Technical Terms, Fifth Edition.*, as an:

> Electrostatic shield composed of wire mesh or a series of parallel wires, usually connected at one end to another connector which is grounded. Also known as a Faraday cage; Faraday screen.

A Faraday screen is defined by Mott at Col. 1, lines 50-54 as follows:

> A Faraday cage may be defined as an electrostatic shield composed of a continuous mesh or series of interconnected electrical conductors which surrounds a defined volume of space.

As amended, Applicant's claimed method for forming a metallized composite includes depositing a metal on a first thermoplastic layer to form a discontinuous layer of the metal, wherein the discontinuous layer includes discrete islands of metal. A second thermoplastic layer is melted onto the discontinuous layer to form the metallized composite.

There is no disclosure or suggestion in Mott of Applicant's claimed method of depositing a discontinuous layer of discrete metal islands on a first thermoplastic layer. In particular, there is no disclosure or suggestion of substituting the continuous or discontinuous metal layer formed by the method taught by Mott with Applicant's claimed method that includes depositing a discontinuous layer of discrete metal islands. Mott, in fact, teaches away from forming a discontinuous layer of discrete metal islands because such a discontinuous layer would not constitute a "Faraday cage," as that term is defined by Mott. Specifically, a discontinuous layer of discrete metal islands would not constitute a "continuous mesh or series of interconnected electrical conductors" of a Faraday cage. Therefore, there is no disclosure or suggestion of Applicant's claimed method in Mott, and Applicant's claimed method, as set forth in Claims 1, 6, 9, 13, 23 and 24 meet the requirements of 35 U.S.C. § 103(a) in view of Mott.

Rejection of Claims Under 35 U.S.C. § 103(a) Over Mott in View of U.S. 5,380,474 and U.S. 3,996,461

Claims 7 and 10-12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Mott as applied to Claim 9 above, and further in view of U.S. 5,380,474 (hereinafter "Rye, *et al.*") and U.S. 3,996,461 (hereinafter "Sulzbach, *et al.*"). In particular, the Examiner stated that it would have been obvious to one of skill in the art to modify the method of Mott by depositing a thin layer of metal by electron beam evaporation, ion plating, induction heating or thermal evaporation as taught by Rye, *et al.* and Sulzbach *et al.* as methods of depositing thin film.

Claims 7 and 10-12 all depend from independent Claim 1. Therefore, Claims 7 and 10-12 all include the limitation of Applicant's Claim 1, as amended, of depositing a metal on a first thermoplastic layer to form a discontinuous layer that includes discrete islands of metal.

Neither Rye *et al.* nor Sulzbach *et al.* remedy the deficiencies of Mott. In particular, there is no disclosure or suggestion in Rye *et al.* or Sulzbach *et al.*, taken separately or together, of depositing a metal on a first thermoplastic layer to form a discontinuous layer of discrete islands

of metal. Further, there is no disclosure or suggestion in either of these references of laminating a second thermoplastic layer onto the discontinuous layer of discrete metal islands to form a metallized deposit. Therefore, there is no disclosure or suggestion in Mott, Rye *et al.* or Sulzbach *et al.*, taken either separately or in combination, of Applicant's claimed method for forming a metallized composite, as set forth in Applicant's amended independent Claim 1. Further, since Claims 5, 7 and 10-12 depend from independent Claim 1, there also is no disclosure or suggestion in any of the cited references, taken either separately or in combination, of the method set forth in dependent Claims 7 or 10-12. Applicant's method, as claimed in Claims 7 and 10-12 meet the requirements of 35 U.S.C. § 103(a) in view of Mott, Rye *et al.* and Sulzbach *et al.*, taken either separately or in combination.

Rejection of Claims Under 35 U.S.C. § 103(a) in View of U.S. 5,165,985

Claims 1, 13-16 and 22-24 are rejected under 35 U.S.C. § 103(a) in view of U.S. 5,165,985, issued to Wiste, *et al.* (hereinafter "Wiste, *et al.*"). In particular, the Examiner stated that Wiste, *et al.* disclose a method of making a flexible, transparent film for electrostatic shielding that employs depositing slivers of silver tow to a thermoplastic sheet in a regular patten or random distribution, and bonding an extruded thermoplastic cover sheet onto the sheet of thermoplastic material to form a film by pressing between cylinders. The Examiner stated that, by depositing slivers of silver tow to the thermoplastic sheet material, the metal is obviously deposited to form a discontinuous layer of metal on the thermoplastic layer, as is claimed by Applicant.

Wiste, *et al.* is directed to forming a flexible transparent film for electrostatic shielding. As stated by the Examiner, the method includes depositing slivers of metal in the form of tow. Tow is described by Wiste, *et al.* at Col. 5, lines 19-23, as follows:

> The tow 14 may comprise a plurality of very long conductive strands, or shorter slivers which are intertwined to form a rope-like tow. The strands or slivers should be very thin, i.e., a diameter no greater than about 12 μm.

Tow is further described at Col. 5, lines 30-39, as forming a cohesive rope:

> Each of the tows comprise a plurality of slivers having an average length, depending upon the particular tow, of about 50 mm, 100 mm or 200 mm, the slivers being staggered and intertwined to form a cohesive rope of tow having a diameter in the range of 8-15 mm. These tows have adequate tensile strength to maintain their form if not handled too roughly, i.e., they may be conveyed reasonable distances without tearing or undue stretching. For fabrication of a film having a width of about 30 cm, four such tows are used.

As also stated by the Examiner, the slivers may be applied to a thermoplastic sheet in a regular pattern or in a random distribution. Regardless, however, as applied to the thermoplastic material, the slivers of the tow overlap slightly to impart conductivity, and thereby constitute an electrostatic shield. Specifically, as stated at Col. 6, lines 18-21:

> When the slivers are applied, they form an essentially two-dimensional network, although the slivers do overlap slightly to impart conductivity throughout the network.

As with Mott, described above, the slivers are intended to form a Faraday cage.

There is no disclosure or suggestion in Wiste, *et al.* of depositing metal on a thermoplastic layer to form a discontinuous layer of discrete metal islands, as claimed by Applicant. To the contrary, Wiste, *et al.*, as with Mott, teach away from forming a layer of discrete metal islands because such a layer would not be electrically conductive. Therefore, Applicant's method, as set forth in Claim 1, as amended, and in dependent Claims 13-16 and 22-24, meets the requirements of 35 U.S.C. § 103(a), in view of Wiste, *et al.*.

Rejection of Claims Under 35 U.S.C. § 103(a) in View of U.S. 5,277,734

Claims 1, 6, 13, 21 and 24-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 5,277,734, issued to Bayer (hereinafter "Bayer"). The Examiner stated that Bayer discloses a method of making a multi-layer flexible electric conductive circuit that includes transferring circuit traces to a base material of a flexible plastic sheet, and then applying an insulating sheet over the circuit traces to thereby form a discontinuous layer of metal deposited on a thermoplastic layer to form a metallized composite, as claimed by Applicant.

Bayer is directed to a method for forming an electrically-conductive circuit sheet. The method includes depositing conductive circuit traces or strips by lamination on insulating base materials. The electrically conductive strips have terminals. As stated at Col. 2, line 62 through Col. 3, line 5 of Bayer:

> Referring now to the drawings, and more particularly to FIG. 1, there is shown generally at 10, a conductive circuit constructed in accordance with the present invention. The conductive circuit is comprised of flat conductive circuit traces or strips 11, which are made of thin conductive sheet material, herein thin conductive foil, such as 0.013 mm thick foil. These strips 11 are each provided with terminals 12 and have an adhesive backing surface 13 to adhesively retain same on an insulating base material 14. The strips may also have terminals 12 formed integrally therewith.

Additional layers can be deposited over the circuit strips. The method disclosed by Bayer forms an electrically conductive circuit.

As with the other references cited by the Examiner, there is no disclosure or suggestion in Bayer of forming a discontinuous layer of discrete metal islands. Further, there is also no disclosure or suggestion in Bayer of forming a discontinuous layer of discrete metal islands on a first thermoplastic layer followed by laminating a second thermoplastic layer onto the discontinuous layer of discrete metal islands to form a metallized composite. Therefore, there is no disclosure or suggestion of Applicant's claimed method, as set forth in independent Claim 1 or dependent Claims 6, 13, 21 or 24-26.

Applicant's claimed method meets the requirements of 35 U.S.C. § 103(a) in view of Bayer.

SUMMARY AND CONCLUSIONS

Applicant has amended the application and claims to meet the requirements of 35 U.S.C. § 112, first paragraph. The instant application is a divisional of U. S. Serial No. 09/223,545, to which priority is claimed, and includes no new matter. Applicant's method, as claimed, meets the requirements of 35 U.S.C. § 103(a) in view of Mott, Rye, *et al.*, Sulzbach, *et al.*, Wiste, *et al.*

and Bayer, taken either separately or in combination. Therefore, Applicant respectfully requests reconsideration and withdrawal of the pending rejections.

If the Examiner believes a telephone conference would expedite prosecution of the instant application, he is invited to call the Applicant's undersigned attorney at (978) 341-0036.

Respectfully submitted,

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Dated: 1/13/03

MARKED UP VERSION OF AMENDMENTS

Claim Amendments Under 37 C.F.R. § 1.121(c)(1)(ii)

1. (Amended) A method for forming [an] a metallized composite, comprising the steps of:
   a) depositing a metal on a first thermoplastic layer to [from] form a discontinuous layer of said metal, said discontinuous layer including discrete islands of metal; and
   b) laminating a second thermoplastic layer onto said discontinuous layer to form said metallized composite[, thereby forming the metallized composite].

4. (Amended) The method of Claim 1, further including the step of thermoforming [a thermoplastic polymer at a surface of] the metallized composite.

5. (Amended) The method of Claim 1, further including the step of vacuum-forming [a thermoplastic polymer at a surface of] the metallized composite.

17. (Amended) The method of Claim [15] 13, wherein said first thermoplastic layer is bonded to said second thermoplastic layer by depositing an adhesive on said discontinuous layer of metal and said first thermoplastic layer prior to laminating said second thermoplastic layer onto the discontinuous layer.

19. (Amended) The method of Claim [15] 13, wherein said first thermoplastic layer is bonded to said second thermoplastic layer by depositing an adhesive on said second thermoplastic layer prior to laminating the second layer onto the discontinuous layer, whereby said adhesive is trapped between said first and second thermoplastic layers of the metallized sheeting.